

WHAT IS CLAIMED IS:

1. A method for treating a semiconductor processing component, comprising:
exposing the component to a halogen gas at an elevated temperature;
oxidizing the component to form an oxide layer; and
removing the oxide layer.
2. The method of claim 1, wherein the steps of exposing the component to halogen gas and oxidizing the component are carried out simultaneously.
3. The method of claim 1, wherein the halogen gas comprises a halogen from the group consisting of chlorine and fluorine.
4. The method of claim 3, wherein the halogen gas comprises HCl.
5. The method of claim 1, wherein the halogen gas is present at a partial pressure within a range of about 0.01 to about 10%.
6. The method of claim 1, wherein the step of oxidizing the component is carried out at a temperature within a range of about 950 to about 1300 degrees C.
7. The method of claim 1, wherein the step of oxidizing is carried out in a wet ambient atmosphere.
8. The method of claim 1, wherein the semiconductor processing component has a metal impurity, and the halogen gas reacts with the metal impurity to form a reaction product which volatilizes during the step of exposing.
9. The method of claim 1, wherein the semiconductor processing component comprises a component from the group consisting of semiconductor wafer paddles, process tubes, wafer boats, liners, pedestals, long boats, cantilever rods, wafer carriers, process chambers, dummy wafers, wafer susceptors, focus rings, suspension rings.

10. The method of claim 1, wherein the semiconductor processing component comprises silicon carbide.
11. The method of claim 10, wherein the semiconductor processing component is formed by chemical vapor deposition.
12. The method of claim 10, wherein the semiconductor processing component comprises a substrate and a silicon carbide coating overlying the substrate.
13. The method of claim 12, wherein the silicon carbide coating is deposited by chemical vapor deposition.
14. The method of claim 12, wherein the substrate comprises elemental silicon.
15. The method of claim 14, wherein the substrate comprises silicon carbide with said elemental silicon impregnated thereon.
16. The method of claim 1, wherein the step of removing the oxide layer is carried out by exposing the oxide layer to a solution to solubilize the oxide layer.
17. The method of claim 16, wherein the solution comprises HF.
18. The method of claim 16, wherein solution has a pH less than about 3.5.
19. The method of claim 1, further comprising machining the component prior to the exposing and oxidizing steps.
20. The method of claim 19, wherein machining is carried out by grinding the component with a diamond tool.
21. The method of claim 1, wherein the oxide layer is removed prior to use in a semiconductor processing operation.

22. The method of claim 1, wherein the oxide layer is removed prior to putting the component into service as a semiconductor processing component.

23. The method of claim 1, further comprising a step of rinsing the component prior to exposing.

24. The method of claim 23, wherein the step of rinsing comprises rinsing with deionized water.

25. The method of claim 24, wherein the step of rinsing comprises rinsing with deionized water while agitating.

26. The method of claim 25, wherein agitating comprises exposing the component to an ultrasound treatment.

27. The method of claim 23, wherein the rinsing is carried out with an acidic solution.

28. The method of claim 1, further comprising a step of exposing the component to a stripping solution prior to exposure to halogen gas.

29. The method of claim 28, wherein the stripping solution comprises an acidic solution.

30. A method for removing a contaminant from a semiconductor processing component, comprising:

reacting the contaminant at an elevated temperature to form a reaction product;
oxidizing the component to form an oxide layer; and
removing the oxide layer.

31. The method of claim 30, wherein the steps of reacting and oxidizing are carried out simultaneously.

32. The method of claim 30, wherein the reaction product has a higher volatility than the contaminant.

33. The method of claim 32, wherein the reaction product vaporizes at said elevated temperature so as to be removed from the semiconductor processing component.

34. A method for treating a semiconductor processing component, comprising: reacting a contaminant contained along a surface portion of the component, at an elevated temperature to form a reaction product, wherein the outer surface portion has a surface roughness less than about 2 microns.

35. The method of claim 34, wherein the component has an impurity content of less than about 1000 ppm along said outer surface portion of the component as measured by SIMS at a depth of 10 nm from the surface of the component.

36. A semiconductor processing component comprising silicon carbide, the component having a surface having an R_a less than about 2 microns, and an impurity content of less than about 1000 ppm along an outer portion of the component as measured by SIMS at a depth of 10 nm from the surface of the component.

37. The method of claim 36, wherein the component comprises a substrate and a silicon carbide coating thereon.

38. The method of claim 36, wherein the component is machined to have said R_a less than about 2 microns.

39. The method of claim 36, wherein said impurity content is less than about 500 ppm.

40. The method of claim 36, wherein said impurity content is less than about 200 ppm.

41. A semiconductor processing component for receiving a semiconductor wafer, the component having a surface having an R_a less than about 2 microns, and an impurity content of less than about 1000 ppm along an outer portion of the component, as measured by SIMS at depth of 10 nm from the surface.